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10/566,867	07/28/2006	Graham Collins	H27650 42706-2300	9933

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EXAMINER	
DINH, BACH T	

ART UNIT	PAPER NUMBER
1795	

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12/24/2009	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/566,867	COLLINS, GRAHAM	
	Examiner	Art Unit	
	BACH T. DINH	1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *02/02/2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-21* is/are pending in the application.

4a) Of the above claim(s) *20 and 21* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-19* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☒ Claim(s) *1-21* are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *02 February 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *02/02/2006*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Summary

1. This is the initial office action in response to the 10/566,867 application filed on 02/02/2006.

2. Claims 1-21 are currently pending.

3. Claims 1-21 are subjected to restriction requirement.

4. Claims 20-21 are withdrawn from consideration according to Applicant's telephonic election.

Priority

5. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Election/Restrictions

6. Restriction is required under 35 U.S.C. 121 and 372.

This application contains the following inventions or groups of inventions which are not so linked as to form a single general inventive concept under PCT Rule 13.1.

In accordance with 37 CFR 1.499, applicant is required, in reply to this action, to elect a single invention to which the claims must be restricted.

Group 1, claim(s) 1-19, drawn to electrochemical sensors having a current collector and seal combination.

Group 2, claim(s) 20-21, drawn to methods of manufacturing a current collector and seal combination.

7. The inventions listed as Groups 1 and 2 do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons: the special technical feature which is common to both groups is the compliant seal formed around the current collector. Tabata et al. (US 5,667,406) discloses a current collector 11 and compliant seal A combination (figure 6). Watanabe et al. (US 5,224,875) also discloses a current collector C and compliant seal B combination (figures 1-2). Hayashi et al. (US 5,662,336) discloses the current collector 30 and compliant seal 10 combination (figure 4). The current collector and compliant seal combinations disclosed by Tabata, Watanabe and Hayashi all read on the claimed common technical feature current collector and compliant seal combination of groups 1 and 2. Derr (US 2006/0108223) discloses an electrochemical sensor comprising base plate 12 made of elastic material [0014], which includes flexible plastic [0052] and conducting rods 35, 36 (figure 9) that extends through the base plate 12 [0056]. The conducting rods of Derr are connected to their respective electrodes; therefore, Derr discloses the common technical feature of groups 1 and 2.

8. During a telephone conversation with Ablin Gess on 11/25/2009 a provisional election was made with traverse to prosecute the invention of group 1, claims 1-19. Affirmation of this election must be made by applicant in replying to this Office action. Claims 20-21 withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

Claim Objections

9. Claim 17 is objected to because of the following informalities: On line 19, the word "collects" is believed to be the misspelled of "collectors". Appropriate correction is required.

Claim Rejections - 35 USC § 112

10. Claims 14-16 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Current claims recite "the electrochemical sensor" on line 1; however, the claim 12, of which claims 14-16 depend on, is drawn to a current collector and seal combination.

Therefore, it is unclear as to which structure of the claimed apparatus that claims 14-16 are drawn to. For compact prosecution, claims 14-16 are examined as dependents of claim 12.

Claim Rejections - 35 USC § 102

11. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

12. Claims 1-2, 4-8 and 12 are rejected under 35 U.S.C. 102(e) as being anticipated by Derr (US 2006/0108223).

Addressing claim 1, Derr discloses a current collector 35 (figure 9) and seal combination (base plate 12, figure 9) for an electrochemical sensor (measuring device, figure 1), in which are located sensing 4 (figure 3) and counter (15, figure 3, the electrodes 4 and 15 complete the sensing circuit; therefore, electrode 4 is the sensing electrode and electrode 15 is the counter electrode), and connection apertures (apertures in the housing body for the seal 12 and the tip of the sensing electrode 4), the current collector and seal combination including:

A flexible current collector 36 (the current collector 36 is bent in different direction in figure 9; therefore, the current collector 36 is flexible) adapted for direct contact with the counter electrode 15 (figures 8-9) and

A compliant seal 12 adapted to fit in the one of the connection apertures (figure 3), the current collector 36 extending through the compliant seal 12,

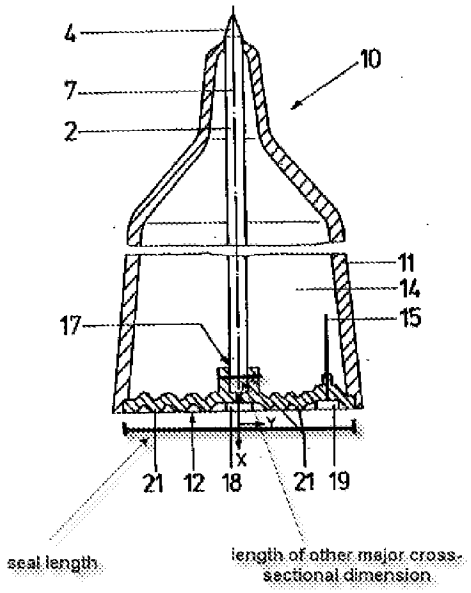
The seal 12 being in contact with the collector 36 substantially throughout its length along the current collector and

The seal being of an elastomeric material ([0014], the base plate 12 is elastic and is made of flexible plastic [0052]; therefore, the base plate 12 is made of elastomeric material),

The arrangement being such that compressive stress induced in the seal by reaction from the connection aperture urges the seal into distributed sealing contact with the current collector substantially through the length of the seal (in figure 3, the base plate 12 is a diaphragm with folded sections, which means that the base plate, when flattened, is longer in length than the length of the aperture of the housing; therefore, when the base plate is fitted in the aperture, a compressive force would be exerted onto the base plate by the aperture of the housing due to the difference in length, to form the fold sections; furthermore, the compression force would also increase the sealing contact between the base plate 12 and the current collector 36; hence, the disclosure of Derr reads on the limitation of claim 1).

Addressing claim 2, in the inserted figure 3 below, the seal length as indicated is longer than the length of the indicated major cross-sectional dimension.

FIG 3



Addressing claims 4-5, figure 9 of Derr shows that the length of the seal in the manner indicated in the above picture is at least 30 times larger than the diameter of current collector 36. Therefore, Derr discloses the ratios of current claims.

Addressing claims 6-8, Derr discloses the seal 12 comprises a central bore for receiving the current collector 36 (figure 9); therefore, Derr discloses the structure of the current collector and seal combination of current claims. The subject matters of current claims are drawn to the processes of forming the current collector and the seal combination, which do not further structurally limit the claimed apparatus (MPEP 2113).

Addressing claim 12, in the inserted figure 3 above, the tip of the folded section is the claimed tapered nose.

Claim Rejections - 35 USC § 103

13. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

14. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

15. Claims 1-8, 10-15, 17 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lofgren (US 3,708,412) in view of Tabata et al. (US 5,667,406).

Addressing claims 1 and 13, Lofgren discloses an electrochemical gas sensor (1:6-15, figure 1) having:

A housing 10 having at least one wall and a plurality of connection apertures through the wall, the apertures having bores (the housing 10 has apertures with bores, through which the electrode leads 17 and 18 extend),

Sensing and counter electrodes (12 and 16, electrode 12 comes into contact with the measuring medium and electrode 16, thereby completing the measuring circuit; therefore, electrode 12 is the sensing electrode and electrode 16 is the counter electrode),

A liquid electrolyte 11 contained in the housing in chemical contact with the electrodes (figure 1), and

A plurality of current collectors 17 and 18 in electrical contact with respective ones of the respective electrodes,

Furthermore, Lofgren shows that the current collectors 17 and 18 are bent in different direction as they extend from the electrodes, through the housing, to the outside; therefore, the current collectors 17 and 18 are flexible and are used for establishing electrical connection between the electrodes and outside circuitry (3:35-38).

Lofgren is silent regarding a compliant seal adapted to fit in the one of the connection apertures and the configuration of the flexible current collector and the compliant seal as required by claim 1.

Tabata discloses waterproof seal for connector (figures 6-7); wherein, the flexible connector wire 11 extends through a compliant seal A made of an elastomeric material (4:51-54, the seal is made of elastic synthetic rubber, which is elastomeric material) and the seal A being contact with the collector 11 substantially throughout its length along the current collector (figures 6-7) and the arrangement being such that compressive stress induced in the seal A by reaction from the connection aperture urges the seal into distributed sealing contact with the current collector 11 substantially throughout the length of the seal (5:5-30, the lip 19 in uncompressed stage has a diameter that is larger

than the diameter of the cavity 46 and the inner lip 22 has a diameter that is smaller than the outer diameter of the wire; therefore, when the seal A is inserted into the cavity 46, the compressive stress induced in the seal A by reaction from the cavity 46 would urge the seal into distributed sealing contact with the wire substantially throughout the length of the seal A).

At the time of the invention, one with ordinary skill in the art would have found it obvious to modify the gas sensor of Lofgren with the waterproof seal of Tabata for each of the flexible current collectors 17 and 18 because the waterproof seal would prevent water from entering the gas sensor (Tabata, 2:28-34) when the gas sensor of Lofgren is used for measuring dissolved gas in liquid sample (Lofgren, 1:6-15).

In the modified gas sensor of Lofgren, the current collectors 17 and 18 would extend within their seals through respective ones of the apertures and the compliant seals A of Tabata are in compression against both the current collectors 17 and 18 and the bores of the apertures in the housing 10 in the similar manner as the complaint seal A is in compression against both the wire 11 and the cavity 46 (Tabata, 5:5-30).

Addressing claims 2-3, figures 6-7 of Tabata, the seal A has many portions with different outer diameters with the outer diameters of the tip portions being the smallest; therefore, the length of the seal A is clearly shown in figures 6-7 as being at least 3 times larger than the outer diameters of the tip portions of the seal.

Addressing claim 4, figure 6 of Tabata shows that the length of the seal A is more than ten times larger than the diameter of the wire 11.

Addressing claim 5, Tabata is silent regarding the length of the seal to the diameter of the wire is at least of the order to 30:1.
At the time of the invention, one with ordinary skill in the art would have found it obvious to modify the seal of the gas sensor of Lofgren and Tabata to have a length that is at least 30 times larger than the diameter of the current collector because doing so is a matter of engineering choice and a longer seal would provide additional protection for the current collector along its length. Therefore, one would have arrived at the claimed ratio of the length of the seal to the diameter of the current collector is at least of the order of 30:1 when performing routine experiment in order to optimize the protection provided by the seal to the current collector.

Addressing claims 6-8, Tabata discloses the seal A has a central through bore through which the wire 11 extends; therefore, Tabata discloses the structure of the current collector and seal combination. The subject matters of current claims are drawn to the processes of forming the current collector and the seal combination, which do not further structurally limit the claimed apparatus (MPEP 2113).

Addressing claim 10, Tabata discloses in figure 4 that the seal A has one or more ridges 19 extending around its outer circumference.

Addressing claim 11, Tabata discloses the seal A has a cylindrical body and a larger diameter outer end boss 20 (figure 4).

Addressing claim 12, Tabata discloses the end tips of the seal A are tapered (figure 4).

Addressing claim 14, Tabata discloses the outer diameter of the ridges 19 is larger than the inner diameter of the cavity 46 (5:11-13); therefore, Tabata discloses an interference fit.

Addressing claim 15, Tabata discloses the seals have cylindrical bodies and the larger diameter outer end bosses 20 (figure 4) and the cavity 46 or connection apertures have a complementary shape (figure 6).
In the modified gas sensor of Lofgren the apertures made in the housing body 10 would have complementary shape for securely fitting the waterproof seals of Tabata with the current collectors 17 and 18.

Addressing claim 17, Lofgren discloses an electrochemical gas sensor (1:6-15, figure 1) having:

A housing 10 having at least one wall and a plurality of connection apertures through the wall, the apertures having bores (the housing 10 has apertures with bores, through which the electrode leads 17 and 18 extend),

Sensing and counter electrodes (12 and 16, electrode 12 comes into contact with the measuring medium and electrode 16 completes the measuring circuit; therefore, electrode 12 is the sensing electrode and electrode 16 is the counter electrode),

A liquid electrolyte 11 contained in the housing in chemical contact with the electrodes (figure 1), and

A plurality of current collectors 17 and 18 in electrical contact with respective ones of the respective electrodes,

Furthermore, Lofgren shows that the current collectors 17 and 18 are bent in different direction as they extend from the electrodes, through the housing, to the outside; therefore, the current collectors 17 and 18 are flexible and are used for establishing electrical connection between the electrodes and outside circuitry (3:35-38).

Lofgren is silent regarding a compliant seal adapted to fit in the one of the connection apertures and the configuration of the flexible current collector and the compliant seal as required by claim 1.

Tabata discloses waterproof seal for connector (figures 6-7); wherein, the flexible connector wire 11 extends through a compliant seal A made of an elastomeric material (4:51-54, the seal is made of elastic synthetic rubber, which is elastomeric material) and the seal A being contact with the collector 11 substantially throughout its length along the current collector (figures 6-7) and the arrangement being such that compressive stress induced in the seal A by reaction from the connection aperture urges the seal into distributed sealing contact with the current collector 11 substantially throughout the length of the seal (5:5-30, the lip 19 in uncompressed stage has a diameter that is larger

than the diameter of the cavity 46 and the inner lip 22 has a diameter that is smaller than the outer diameter of the wire; therefore, when the seal A is inserted into the cavity 46, the compressive stress induced in the seal A by reaction from the cavity 46 would urge the seal into distributed sealing contact with the wire substantially throughout the length of the seal A).

At the time of the invention, one with ordinary skill in the art would have found it obvious to modify the gas sensor of Lofgren with the waterproof seal of Tabata for each of the flexible current collectors 17 and 18 because the waterproof seal would prevent water from entering the gas sensor (Tabata, 2:28-34) when the gas sensor of Lofgren is used for measuring dissolved gas in liquid sample (Lofgren, 1:6-15).

In the modified gas sensor of Lofgren, the current collectors 17 and 18 would extend within their seals through respective ones of the apertures and the compliant seals A of Tabata are in compression against both the current collectors 17 and 18 and the bores of the apertures in the housing 10 in the similar manner as the complaint seal A is in compression against both the wire 11 and the cavity 46 (Tabata, 5:5-30).

With respect to the limitation "the current collects are preliminarily located … the back-fillings are compressed by end caps" is drawn to the process of forming the seal around the current collector, which does not further structurally limit the claimed apparatus (MPEP 2113). In figure 7, Tabata discloses the seal A is formed around the wire 11 and the seal A is compressed by the end cap 41, which reads on the structure of the seal and current collector as claimed.

Addressing claim 19, Tabata discloses the force exerted by the housing body 45 deform the outer ridges 19 of the seal A without showing any deformation caused to the housing body 45 by the seal A; therefore, it is Examiner's position that the housing body 45 is rigid and has the elastic modulus that is at least two orders larger than the elastic modulus of the compliant seal A.

Lofgren is silent regarding the material of the housing body 10; however, it is quite obvious that the housing 10 of the gas sensor has to have high rigidity in order to provide protection for the internal components. Therefore, at the time of the invention, one with ordinary skill in the art would have modify the body of the gas sensor of Lofgren to have the elastic modulus of at least two orders larger than the elastic modulus of the seal A because the housing having such property would provide adequate compression force to deform the outer ridges 19 of the seal A; thereby, providing waterproof sealing.

16. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lofgren (US 3,708,412) in view of Tabata et al. (US 5,667,406) as applied to claims 1-8, 10-15, 17 and 19 above, and further in view of Watanabe et al. (US 5,224,875).

Addressing claim 9, Tabata is silent regarding the seal having two complementary halves having a central groove for receiving the current collector.

Watanabe discloses a watertight seal (figure 5) comprises two complementary halves having a central groove for receiving the wire C.

At the time of the invention, one with ordinary skill in the art would have found it obvious to modify the seal of Lofgren and Tabata to have two complementary halves as

disclosed by Watanabe because the seal of Watanabe would provide secure watertight connection for the connection wire (Watanabe, 3:2-13). Furthermore, one would have obtained the predictable result of forming waterproof terminal connection for the current collector of Lofgren and Tabata when performing the simple substitution of the watertight seal having two complementary halves of Watanabe for the waterproof seal A of Tabata (MPEP 2141, KSR, Rationale B).

17. Claims 16 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lofgren (US 3,708,412) in view of Tabata et al. (US 5,667,406) as applied to claims 1-8, 10-15, 17 and 19 above, and further in view of Silfverberg (US 6,638,107).

Addressing claims 16 and 18, Tabata is silent regarding metallic end caps clipped to the housing and captivating the current collectors, thereby providing electrical connections for the sensor.

Silfverberg discloses an electrical connector; wherein, the electrical connector 70 is metallic end cap (4:9, figures 8-9) that clips to the housing 23 and captivating the current collectors 11 (figure 8, the conductors 11 have surrounding sheath to provide electrical insulating and sealant, 4:64-5:13), thereby providing electrical connections (5:15-38).

At the time of the invention, one with ordinary skill in the art would have found it obvious to modify the gas sensor of Lofgren and Tabata with the metallic cap end 70 of Silfverberg for each of the current collector of Lofgren because the metallic cap 70 would act as electrical connector as well as providing ring seal for the current collector (Silfverberg, 5:5-12).

Conclusion

18. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Hayashi et al. (US 5,662,336) discloses the current collector and compliant seal combination that is similar to that of current application (figures 1-5)

Any inquiry concerning this communication or earlier communications from the examiner should be directed to BACH T. DINH whose telephone number is (571)270-5118. The examiner can normally be reached on Monday-Friday EST 7:00 A.M-3:30 P.M.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam X. Nguyen can be reached on (571)272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Nam X Nguyen/
Supervisory Patent Examiner, Art Unit 1753

BD
12/19/2009